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PATENT
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Appl. No.: 10/563,126

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DECLARATION UNDER 37 CFR 1.132

COMMISSIONER FOR PATENTS

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Dear Sir:

I, Yasufumi TAKAHASHI, a citizen of Japan residing at Kobe-city, Hyogo, Japan, hereby declare and state:

1. I received a Master's degree in Kyoto University, Department of Molecular Engineering in March 1997. I entered SANYO Electric Co., Ltd. in April, 1997, and have been engaged in the research and development of lithium ion batteries for fourteen years.

2. I am a co-inventor of the invention described and claimed in application No. 10/563,126 (hereinafter: "the present application") and have read and understood claims 1-3, 6, 11 and 12 of the application.

3. In order to show unexpected results over the entire range of 10 – 20% by volume of ethylene carbonate contained in the nonaqueous electrolyte of the nonaqueous electrolyte secondary battery defined in the claims and to show criticality of the range, I have

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performed the following experiments:

<Battery C1>

In the "Preparation of Electrolyte Solution" as described in Example 1-1 of the specification of the present application, ethylene carbonate (EC) and diethyl carbonate (DEC) were mixed at a 1:9 ratio by volume. The procedure of Example 1-1 was followed to construct a battery C1 of the present invention. This battery is identical in construction to the battery B1 of the present invention as described in Example 2-1 of the present application.

<Battery C2>

In the "Preparation of Electrolyte Solution" as described in Example 1-1 of the specification of the present application, ethylene carbonate (EC) and diethyl carbonate (DEC) were mixed at a 1.5:8.5 ratio by volume. Otherwise, the procedure of Example 1-1 of the present application was followed to construct a battery C2 of the present invention.

<Comparative Battery Z1>

In the "Preparation of Electrolyte Solution" as described in Example 1-1 of the specification of the present application, ethylene carbonate (EC) and diethyl carbonate (DEC) were mixed at a 0.5:9.5 ratio by volume. Otherwise, the procedure of Example 1-1 of the present application was followed to construct a Comparative Battery Z1.

[Evaluation of Cycle Characteristics]

In the same manner as Example 1 of the specification of the present application, each of the batteries C1 and C2 of the present invention and the comparative battery Z1 was subjected to a charge-discharge cycle test with an end-of-charge voltage of 4.4 V. Capacity retention values after 100 and 300 cycles are shown in Table A. Each of the capacity retention values shown in Table A is indicated by a relative value, taking as 100 the capacity retention value of the Battery C1.

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Table A

	Zr Content (mole %)	EC Content of Electrolyte Solvent (VOL.%)	Capacity Retention (relative value)	
			after 100 Cycles	after 300 Cycles
Comparative Battery Z1	0.5	5	90.9	87.6
Battery C1 (B1) of Present Invention	0.5	10	100	100
Battery C2 of Present Invention	0.6	15	103.1	107.3

Table B shows the results of battery B2 of the present invention and comparative battery Z2, which is identical to the battery B3 shown in Table 2 of the present application, in addition to the results shown in the above Table A. Each of the capacity retention values of battery B2 of the present invention and comparative battery Z2 shown in Table B is indicated by a relative value, taking as 100 the capacity retention value of the Battery C1 (B1).

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Table B

	Zr Content (mole %)	EC Content of Electrolyte Solvent (VOL.%)	Capacity Retention (relative value)	
			after 100 Cycles	after 300 Cycles
Comparative Battery Z1	0.5	5	90.9	87.6
Battery C1(B1) of Present Invention	0.5	10	100	100
Battery C2 of Present Invention	0.5	15	103.1	107.3
Battery B2 of Present Invention	0.5	20	98.5	96.5
Comparative Battery Z2 (B3)	0.5	30	97.8	54.8

As understood from the results shown in Table B, the entire range of an electrolyte solution containing 10 - 20 % by volume of ethylene carbonate as a solvent of the nonaqueous electrolyte secondary battery of the present invention provides unexpected results. Further, Table B shows the criticality of the range of an electrolyte solution containing 10 - 20 % by volume of ethylene carbonate as a solvent.

4. The undersigned hereby declares that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or

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any patent issued thereon.

signed this September 21, 2011

Yasufumi Takahashi
Yasufumi TAKAHASHI